CLAIMS

WHAT IS CLAIMED IS:

1. One or more computer-readable media having stored thereon a computer program that, when executed by one or more processors of the computer, causes the one or more processors to perform acts including:

identifying a plurality of viewing rays to be used to constructed a view image of a scene represented by a mosaic;

checking whether each of the plurality of viewing rays coincides with at least a portion of a captured image;

for each viewing ray that coincides with at least a portion of a captured image, selecting the portion of the captured image;

for each viewing ray that does not coincide with at least a portion of a captured image, generating an interpolated portion by interpolating between at least two portions of one or more captured images based on a constant distance to objects in the scene; and

combining the selected and interpolated portions to generate the view image.

2. One or more computer-readable media as recited in claim 1, wherein each portion comprises a slit image.

3. One or more computer-readable media as recited in claim 1, wherein the

constant distance is calculated based on both a first distance between a center of capture rotation and a nearest object of the scene and a second distance between the center of capture rotation and a farthest object of the scene.

4. One or more computer-readable media as recited in claim 3, wherein the constant distance is calculated as the average of the first and second distances.

5. One or more computer-readable media as recited in claim 1, wherein the constant distance is different for each of a plurality of different portions of the scene.

6. One or more computer-readable media as recited in claim 1, wherein the combining comprises placing the selected and interpolated portions in a side-by-side arrangement to generate the view image.

7. One or more computer-readable media as recited in claim 1, wherein each of the plurality of viewing rays extends from a viewing point within a circular region defined by the mosaic.

8. One or more computer-readable media as recited in claim 1, wherein the view image comprises a stereo image including a left eye view and a right eye view.

6 9. One or more computer-readable media as recited in claim 1, wherein the scene has been previously captured using one or more cameras.

7 10. One or more computer-readable media as recited in claim 1, wherein the scene is a computer-synthesized scene.

11. One or more computer-readable media as recited in claim 1, wherein the scene is represented by a set of concentric circle mosaics based on a set of concentric circles.

12. One or more computer-readable media as recited in claim 11, wherein generating an interpolated portion for a viewing ray further comprises:

identifying an intersection point that is the intersection of the viewing ray in a viewing direction with an outermost concentric circle of the set of concentric circles;

identifying a view termination point that is on the viewing ray and that is the constant distance away from the origin of the set of concentric circles;

identifying first and second image capture points that are adjacent to the intersection point along the outermost concentric circle, and that are on either side of the intersection point;

identifying a first line extending between the first image capture point and the termination point;

identifying a second line extending between the second image capture point and the termination point;

identifying first and second sample rays that are adjacent to the first line and that are on either side of the first line;

identifying third and fourth sample rays that are adjacent to the second line and that are on either side of the second line;

determining a weight for each of the first, second, third, and fourth sample rays; and

combining the weighted values of the first, second, third, and fourth sample rays to generate the interpolated portion for the viewing ray.

13. One or more computer-readable media as recited in claim 12, wherein γ_1 represents an angle between the viewing ray and the first line, wherein γ_2 represents an angle between the viewing ray and the second line, wherein φ_1 represents an angle between the first sample ray and the first line, wherein φ_2 represents an angle between the second sample ray and the second line, and wherein the weight (w_1) of the first sample ray is defined by,

$$w_1 = \frac{\gamma_2}{\gamma_1 + \gamma_2} \cdot \frac{\varphi_2}{\varphi_1 + \varphi_2}.$$

T,0310

14. One or more computer-readable media as recited in claim 12, wherein γ_1

represents an angle between the viewing ray and the first line, wherein γ_2 represents an angle between the viewing ray and the second line, wherein φ_1 represents an angle between the first sample ray and the first line, wherein φ_2 represents an angle between the second sample ray and the second line, and wherein the weight (w_2) of the second sample ray is defined by,

$$w_2 = \frac{\gamma_1}{\gamma_1 + \gamma_2} \cdot \frac{\varphi_1}{\varphi_1 + \varphi_2}$$

15. A method of generating values for a portion of an image of a scene represented by a mosaic to be rendered, the method comprising:

interpolating between at least a portion of each of two or more captured images based on a constant distance to objects in the scene.

16. A method as recited in claim 15, wherein the portion of the image comprises a slit image.

17. A method as recited in claim 15, wherein each of the two or more captured images comprises a slit image.

18. A method as recited in claim 15, wherein the scene is represented by a set of concentric circle mosaics.

18

~~19~~. A method as recited in claim 15, wherein the constant distance is calculated based on both a first distance between a center of capture rotation and a nearest object of the scene and a second distance between the center of capture rotation and a farthest object of the scene.

19 18

~~20~~. A method as recited in claim ~~19~~, wherein the constant distance is calculated as the average of the first and second distances.

20

~~21~~. A method as recited in claim 15, wherein the constant distance is different for each of a plurality of different portions of the scene.

21

~~22~~. One or more computer-readable memories containing a computer program that is executable by a processor to perform the method recited in claim 15.

23. A method comprising:

generating, based on a plurality of viewing rays, a plurality of image values for a view of a scene represented by a mosaic;

using, as a first set of image values for the view, at least a portion of a captured image; and

using, as a second set of image values for the view, interpolated values generated

by interpolating between at least two portions of one or more captured images based on a constant distance to objects in the scene.

24. A method as recited in claim 23, wherein the view image comprises a stereo image including a left eye view and a right eye view.

25. A method as recited in claim 23, wherein the scene is represented by a set of concentric circle mosaics based on a set of concentric circles.

26. A method as recited in claim 25, wherein the constant distance is calculated based on both a first distance between a center of the set of concentric circles and a nearest object of the scene and a second distance between the center of the set of concentric circles and a farthest object of the scene.

27. A method as recited in claim 26, wherein the constant distance is calculated as the average of the first and second distances.

28. A method as recited in claim 23, wherein the constant distance is different for each of a plurality of different portions of the scene.

29. A method as recited in claim 23, wherein the first set of image values and

the second set of image values each comprise a slit image.

27

30. A method as recited in claim 23, wherein the portion of the captured images comprises a slit image.

28

31. One or more computer-readable memories containing a computer program that is executable by a processor to perform the method recited in claim 23.

32. A system comprising:

an observer interface to receive user input commands and identify a viewpoint and a direction of viewing based on the input commands; and

a view renderer, communicatively coupled to the observer interface, to receive the viewpoint and the direction of viewing, to generate values for a portion of an image of a scene represented by a mosaic, and to interpolate between at least two captured images based on a constant distance to objects in the scene.

33. A system as recited in claim 32, wherein the view renderer is further to identify a left viewpoint and a right viewpoint based on the received viewpoint, and to generate a first image of the scene based on the left viewpoint and a second image of the scene based on the right viewpoint.

34. A system as recited in claim 33, further comprising a stereo rendering device, coupled to the view renderer, to display the first and second images concurrently.

35. A system as recited in claim 32, wherein the scene is represented by a set of concentric circle mosaics based on a set of concentric circles.

37 36
~~36~~. A system as recited in claim ~~35~~, wherein the constant distance is calculated based on both a first distance between a center of the set of concentric circles and a nearest object of the scene and a second distance between the center of the set of concentric circles and a farthest object of the scene.

38 37
~~37~~. A system as recited in claim ~~36~~, wherein the constant distance is calculated as the average of the first and second distances.

35
~~38~~. A system as recited in claim 32, further comprising an interface, coupled to the view renderer, via which the view renderer can receive at least a portion of a scene data file from a remote server.

39. One or more computer-readable media having stored thereon a computer program that, when executed by one or more processors of the computer, causes the one or more processors to perform acts including:

accessing a sequence of images captured by moving a camera in a path around a point, the sequence of images including a plurality of image data, each having a ray direction associated therewith;

identifying a left viewpoint and a right viewpoint within a circle defined by the movement of the camera around the point;

obtaining left image data from the sequence of images that has a ray direction substantially aligned with the ray direction from the left viewpoint;

obtaining right image data from the sequence of images that has a ray direction substantially aligned with the ray direction from the right viewpoint;

creating a portion of a left image as seen from the left viewpoint by using the obtained left image data; and

creating a portion of a right image as seen from the right viewpoint by using the obtained right image data.

40. One or more computer-readable media as recited in claim 39, wherein the left image data and the right image data are each a discrete image line formed by multiple pixels having the same ray direction.

41. One or more computer-readable media as recited in claim 39, wherein the ray direction from the left viewpoint is substantially parallel to the ray direction from the right viewpoint.

42. One or more computer-readable media as recited in claim 39, wherein the ray direction from the left viewpoint is a first ray direction and the method includes determining multiple ray directions, one for each pixel width in the created left image.

43. One or more computer-readable media as recited in claim 39, wherein the ray direction from the right viewpoint is a first ray direction and the method includes determining multiple ray directions, one for each pixel width in the created right image.

44. A system comprising:

an observer interface to receive user input commands and identify a viewpoint and viewing direction based on the input commands; and

a view renderer, communicatively coupled to the observer interface, to receive the viewpoint and direction of viewing, and to generate, based on the viewpoint and the direction of viewing, a pair of rendered view images of the scene, wherein the scene is represented by at least one mosaic.

45. A system as recited in claim 44, wherein the view renderer is further to identify a left viewpoint and a right viewpoint based on the received viewpoint, and to generate a first of the pair of images based on the left viewpoint and a second of the pair of images based on the right viewpoint.

46. A system as recited in claim 45, further comprising a stereo rendering device, coupled to the view renderer, to display the first and second images concurrently.

47. A system as recited in claim 44, wherein the view renderer is further to generate values for a portion of one of the pair of rendered view images by interpolating between at least two captured images based on a constant distance to objects in the scene.

48. A system as recited in claim 47, wherein the scene is represented by a set of concentric circle mosaics based on a set of concentric circles, and wherein the constant distance is calculated based on both a first distance between a center of the set of concentric circles and a nearest object of the scene and a second distance between the center of the set of concentric circles and a farthest object of the scene.

49. A system as recited in claim 48, wherein the constant distance is calculated as the average of the first and second distances.

50. A system as recited in claim 44, further comprising an interface, coupled to the view renderer, via which the view renderer can receive at least a portion of a scene data file from a remote server.

51. A method for generating stereo view images of a scene for display, the method comprising:

generating, based on a set of concentric mosaics representing the scene, a pair of rendered view images of the scene from an observer viewpoint within a circular region defined by at least one of the set of concentric mosaics.

52. A method as recited in claim 51, wherein the set of concentric mosaics have been previously captured using one or more cameras.

53. A method as recited in claim 51, wherein the scene is a synthesized scene.

54. A method as recited in claim 51, wherein each of the rendered view images is comprised of a set of slit images, and wherein generating each of the rendered view images comprises:

ascertaining which of the slit images needed for the rendered view image coincide with a previously captured slit image;

ascertaining which of the slit images needed for the rendered view image do not coincide with one of the captured slit images;

generating, using linear interpolation based on a constant distance to objects in the scene, slit images needed for the rendered view image from pairs of captured slit images

whenever a slit image needed for the rendered view image does not coincide with one of the captured slit images using linear interpolation; and

placing the captured slit images ascertained to coincide with slit images needed for the rendered view image, and the generated slit images, in a side-by-side arrangement so as to collectively form an image of a portion of the scene which represents the rendered view image.

55. A method as recited in claim 51, wherein

one of the pair of rendered view images is constructed using a first point of view;

another of the pair of rendered view images is constructed using a second point of view; and

the first point of view and the second point of view are geometrically related by a predetermined distance.

56. A method as recited in claim 55, wherein the predetermined distance is user-changeable.

57. One or more computer-readable memories containing a computer program that is executable by a processor to perform the method recited in claim 51.

add A13